MAY 1942

INCREASED YIELDS FROM CONSERVATION

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

For immediate reading—on the MUST list—is R. E. Uhland's article which begins on the back cover of this issue. Here are THE FACTS about conservation farming and yields. The author has drawn from the results in East, South, Southwest, and Corn Belt to prove that soil conservation is the key to needed production.

UNITED STATES DEPARTMENT OF AGRICULTURE – WASHINGTON

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By Katharine R. Johnson

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SOIL CONSERVATION

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DRAINAGE AND THE FOOD FOR FREEDOM PROGRAM

By JAMES TURNBULL[1]

You can't farm under water.

THE Department of Agriculture is requesting an increase in farm production for 1942 which calls for the greatest effort in the history of American agriculture. New high goals have been set in order to meet the needs of a world at war. The attainment of some of the goals will be difficult, but it can be done—it will be done.

The farmer faces a shortage of labor. Requirements of the armed forces and increased industrial activity combine to limit the supply. Farm machinery will be hard to get. Shortages of critical materials are forcing limited production of machinery used in farming operations.

To counteract these difficulties it is necessary that every farmer make the most efficient use of "every acre of land, every hour of labor, and every bit of farm machinery, fertilizer and other supplies" available.

Improved soil-conserving practices, new seed varieties, and adequate supplies of fertilizer will help us achieve our goals. But of all the farm practices that can increase our food production, there is none that is more important or that will yield more immediate results than adequate drainage. The low farm incomes of the past two decades have made it difficult to raise sufficient funds for maintaining drainage improvements, and the result is that literally millions of acres of poorly drained fertile land now are unable to produce more than a partial crop. This land requires the same amount of labor for cultivation, the same quantity of seed and fertilizer, and uses the same machinery as land capable of producing a full crop.

Have you ever traveled along a country highway with fields on each side of the road? Perhaps the fields are in corn, or wheat, or rye. A beautiful stand, but marred by small areas that are not doing as well as the rest, or bare spots here and there. Then, you may have traveled this same road again after a rain and seen the water standing in these very same areas where the crops look poorest—you can find such spots on most of the farms of the country. They are small

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areas mostly; but sometimes whole fields, and occasionally even extensive areas are in this condition. Usually they are low places where water accumulates after a rain because its only means of escape is through percolation into the soil. Some of the spots are seep areas, kept wet by moisture seeping through the soil from a higher area. The extensive areas are usually those provided with inadequate field or outlet drainage. Can we afford to allow these areas to continue to produce poor crops? Dare we gamble with our freedom when we know that increased crop production will help "win the war and write the peace?"

The magnitude of the area that can be improved for agricultural purposes through drainage is realized by only a few people. It is estimated that in organized drainage districts alone there are almost 25 million acres that are under varying degrees of cultivation but which require drainage rehabilitation in order to make normal yields possible. In addition, over 6 million acres of cultivated land outside of drainage districts require improved drainage outlets. This does not include any of the land needing only field ditches or tile lines for the proper drainage of individual farms, fields, or low places.

Thirty-one million acres of land under partial cultivation requiring drainage improvements other than tile lines and small field ditches—land that could yield millions of bushels of additional crops without use of any more machinery, any more labor, any more seed or fertilizer! It is fertile land, well suited to crop production. Most of it is bottom land free from erosion. Adequate drainage of this land would provide a considerable portion of the increase in crop production required in 1942. It is land requiring no new development, no new roads, or bridges, no new schools—land that can be improved without disturbing wildlife or recreational areas—land that can be drained with a minimum of expense.

In addition to this 31 million acres, there are thousands of farms throughout the country requiring some degree of field drainage. On most of the nation's farms, drainage could increase present crop yields. Drainage of low spots and seep areas not only would increase production on these areas but would make possible the most efficient use of farm labor and machinery.

Seep areas interfere with such soil-conserving practices as contour cultivation, strip cropping, and terracing. Low spots may delay cultivation, planting operations or harvesting, until the soil has dried out sufficiently to allow normal field operations. This may result in decreased crop yields for an entire field. During this period of national emergency we must do all in our power to prevent these lowered yields and crop losses.

As the action agency of the Department charged with instituting proper land use and conservation practices, it is imperative that we of the Soil Conservation Service become drainage-minded. We must go to the farmer with a positive drainage program. By providing technical assistance in the design of adequate drainage systems we can avoid many of the pitfalls of earlier drainage works. Too frequently, ditches have been dug and tile lines installed without proper consideration of all the factors involved. Districts have been organized, and ditches have been dug only to have them fill up with silt from eroding hillsides; infertile land has been unable to carry the burden of drainage taxes and has been abandoned; lack of engineering design has resulted in completely inadequate ditches that fail to provide sufficient runoff capacity and cause reduction in crop yields or total crop failure.

All of the resources of the Soil Conservation Service are pledged to the success of the food for freedom program. Expansion of the drainage work of the Service will contribute to this success.

The Facts About Conservation Farming and Yields

(Continued from back cover)

Conservation measures applied to cotton fields in the Southern Great Plains also greatly increased yields. Near Spur, Tex., the yield of lint cotton on contoured land with closed level terraces was 68 pounds per acre more than on adjacent unterraced and non-contoured land. The value of this increased yield of cotton, figured at the average price per pound received by farmers for each year of the 12-year period, 1927 to 1938, was $7.60 per acre each year. There were 3 years of crop failure in this 12-year period when two crops were destroyed by hail and one crop failed because of two extremely dry years in succession. If these 3 years were omitted, the annual return per acre from the terraced and contoured field was $10.13 greater than the return from the unterraced and uncontoured field.

The effect of contouring and terracing on the yields of grain sorghums was demonstrated in the high plains of Texas in 1937. The average yield of grain from 20 terraced and contoured fields was 723 pounds per

The contoured basins in this gently rolling field increased the moisture retained in the soil and reduced erosion to a minimum.

acre as compared with a yield of 589 pounds per acre from land that was contoured only and a yield of 461 pounds per acre from land where neither contouring nor terracing was practiced. These increases were more significant on the heavier and finer-textured soils where water conservation was highly important.

In South Dakota, the average yield of small grains on contoured land over a 3-year period was 6 percent more than on land that was not contour-farmed. The yield of grain sorghum as a listed row crop was 19 percent greater than when surface-planted. This study shows the practical importance of listing for holding the topsoil. In 1940 the deeper topsoil produced 90 percent more grain than soils in the same area which had lost most of the topsoil. In 1941 the difference was 59 percent.

In the Northeast at Beemerville, N. J., land planted to corn and cultivated on the contour yielded 3 tons more silage per acre than corn planted up and down the slope. The contoured land lost but one-half as much water and one-eighth as much soil as noncontoured land planted to the same crop. In 1938, the yield of green silage from a field planted to a soil conserving grass legume mixture was 14 tons per acre, as compared to a green silage yield of 9 tons per acre from an adjacent plot of corn cultivated up and down the slope. This practice is applicable and can be used profitably on many farms throughout the Northeast.

Potatoes at Beemerville, N. J., in 1941 yielded from 8 to 15 bushels more per acre when planted on the contour. In 1940 the increased yield from contoured land was 23 bushels per acre.

In the potato section around Presque Isle, Maine, both increases and decreases in the yield of potatoes have been reported. The decreases, however, were associated with ponding of water which injured the quality of the potatoes. Preliminary studies show that these defects can be corrected and contour farming can be effectively and economically used in potato production.

For a 6-year period an old established field of Concord grapes that was planted and cultivated on the contour produced an average annual yield of 4,842 pounds of grapes per acre as compared with a yield of 3,933 pounds from adjacent land cultivated up and down the slope. For the 4-year period, 1936 to 1939, when moisture was very limited, the contoured land yielded from 600 to 2,500 pounds of grapes more per acre than land with rows planted up and down the slope. In 1940, however, the rainfall was higher and better distributed, and as a result the yield of contoured grapes was 200 pounds less than that of uncontoured grapes. This slight difference occurred but once in the 6-year period, whereas the average increase in yields from contour farming was 23.1 percent.

In the Blackland region near Temple, Tex., for a 4-year period, 1936 to 1939, terraced and contoured fields produced an annual average of 67 pounds of lint cotton more per acre than comparable unterraced and uncontoured land. This represents a difference of 33 percent. The yield of corn from terraced and contoured land for the same period was 3.8 bushels per acre greater, or 13.8 percent more than that from land not terraced or contoured.

The yield of corn at Zanesville, Ohio, declined where corn followed corn year after year. The average yield for this 5-year period was 20.4 bushels per acre when planted and cultivated up and down the slope.

Corn grown in rotation with fertilizer and lime and contour strip-cropped increased in yield from 31 bushels in 1935 to 55 bushels in 1939.

At Clarinda, Iowa, contour-listed land planted to corn yielded 56.1 bushels per acre in 1933, while non-contour-listed land produced only 33.1 bushels. For a 6-year period that included 3 dry years when chinch bug and grasshopper injury was severe and little corn was produced, the average yield for contoured land planted to corn was 30 bushels as compared with a yield of 18 bushels from noncontoured land. This represents a difference of 12 bushels per acre in favor of contour farming. During this 6-year period, the contoured area retained 13 inches of rainfall more than noncontoured land. This represented an average annual saving of more than 2 inches of rainfall and indicated that every inch of water saved resulted in an added yield of 5½ bushels of corn per acre.

Contouring of intertilled crops is on the steady increase throughout the country and can be profitably extended. According to the Agricultural Adjustment Administration, almost 6½ million acres of land was contoured in the southern region alone last year. Records show that practically no contouring was practiced in Iowa as recently as 1935.

In Montgomery County, the county agricultural agent reported that approximately one-half of all the corn grown in 1941 was planted on the contour. This county in southwestern Iowa is located near the soil conservation experiment station and an old demonstration project. That this case is exceptional is indicated by Agricultural Adjustment Administration records for 1940 which show that payments were made for less than one-quarter million acres of contoured land within 5 Corn Belt States. It is recognized that payments were not made on all contoured land in these States.

Should this conservation practice be extended to one-third of the corn acreage of the Corn Belt, the annual production of corn would be increased by almost 100,000,000 bushels. This estimate is based upon hundreds of observations and is supported by experimental data.

At the New Jersey Experiment Station, tomatoes grown in alternate years with Sudan grass showed a 33-percent greater yield than tomatoes grown year after year on the same land. The mulching of tomato vines with 3 tons of straw per acre almost doubled the yield of tomatoes and improved both size and quality. Raspberry fields similarly treated increased in yield from 35 to 75 percent.

Champaign grapes that were mulched with straw at Hammondsport, N. Y., in 1939, yielded an increase of 98 pounds of grapes for each 100 vines over those not mulched. This represented an increase of 80 percent in the first crop harvested for the young vines.

On the Soil Conservation Experiment Station near Athens, Ga., it was demonstrated that critically eroded areas in the Southeast can be effectively cropped to lespedeza by adding lime and superphosphate and applying a light straw mulch. Without the mulch, the crop failed completely, but wherever a mulch was used a yield of 1½ to 2 tons of hay per acre was produced. This yield was quite comparable to the yields on the station from average cropland receiving the same fertilizer without mulch.

The practice of utilizing crop residues for surface mulching is quite different from the old method of burning or plowing under trashy vegetation and promises to change greatly the agriculture of many sections of the country. The problems presented in the utilization of crop residues vary widely in different sections of the country, and for this reason extensive studies are being carried out to determine the most practical adjustments needed for the different sections.

In order to secure factual information regarding the effect of soil loss on crop yields, a large number of fields were studied in Indiana, Iowa, Missouri, and Ohio. Since management is known to influence erosion, fields were purposely selected to represent different types of management. In table 1, the summary data for Fowler, Ind., and Bethany, Mo., show the very definite relationship existing between depth of topsoil and corn yields. Similar data were secured for Coshocton, Ohio, and Greenfield and Shenandoah, Iowa.

TABLE 1.—Depth of topsoil with yield of corn and percent of field represented by each depth class. Average for a large number of fields at Fowler, Ind., and Bethany, Mo., 1939 and 1940.

Depth class (inches)	Fowler, Ind.		Bethany, Mo.	
	Field area	Yield	Field area	Yield
	Percent	*Bushels per acre*	*Percent*	*Bushels per acre*
0	1.0	19.8	0.5	15.2
1 to 2	3.5	39.6	3.9	24.9
3 to 4	10.4	48.8	24.0	27.3
5 to 6	19.0	56.9	27.3	35.2
7 to 8	25.3	63.3	27.3	41.2
9 to 10	16.4	69.6	12.1	47.2
11 to 12	14.3	75.5	4.0	51.0
13 or more	10.1	81.5	1.0	57.4

A striking example of the effect of conservation farming on production is furnished by 2 fields of Shelby silt loam near Bethany, Mo. The fields had been handled similarly prior to 1935 when a 3-year rotation supported by liming, manuring, fertilizing,

Research findings at Lincoln, Nebr., show that the utilization of wheat stubble as a surface mulch markedly reduces runoff and erosion. Burning increases erosion and runoff and lowers crop yields.

and contour cultivation was initiated on one field. The other field was managed according to the old system of farming and no treatments were added.

In 1940, 5 years after conservation farming was initiated on one of these fields, a survey was made, the results of which are shown in table 2.

It will be noted that there is a close relationship between soil depth and yield on both fields, but there is a striking contrast in production levels. The average yield of corn for the treated field was 69.7 bushels per acre as compared with a yield of 32.5 bushels for the untreated field. Almost one-half of the area of the untreated field measured less than 5 inches in depth of topsoil; whereas, about one-fifth of the treated field fell into this depth class. The average depth of topsoil for the treated field was 5.9 inches as compared with a depth of 4.6 inches for the untreated field.

Observations showed that the soil losses from the field on which conservation measures were applied were very small since 1935, but the losses from the check-field were extremely large. It is recognized, of course, that these fields were not perfect checks; but it is significant that the field on which conservation farming was followed yielded more than twice as much as the field on which conservation practices had not been applied.

TABLE 2.—*Effect of conservation farming on depth of topsoil and yield of corn, Bethany, Mo.*

Depth of topsoil (inches)	Exploitive farming		Conservation farming (Since 1935)	
	Field area	Yield	Field area	Yield
	Per-cent	*Bushels per acre*	*Per-cent*	*Bushels per acre*
0 to 2	20.5	20.6	4.6	50.7
3 to 4	26.7	27.0	16.6	60.0
5 to 6	31.4	38.6	43.7	66.7
7 to 8	17.1	41.1	25.8	80.0
9 to 10	3.8	42.4	6.6	84.0
11 to 12	0.5	51.4	2.7	76.0

These results are in line with findings of State agricultural experiment stations. For example, the Indiana State Experiment Station reported an average yield of 39 bushels of corn per acre for untreated land cropped annually to corn, as contrasted with an average yield of 61 bushels from adjacent land treated with fertilizer, lime, and crop residues, and cropped to a 4-year rotation of corn-corn-wheat-clover. Under a 5-year rotation of corn-corn-soybeans-wheat-clover in a livestock system of farming where fertilizer, lime, and manure were used, the average corn yield was 64 bushels per acre. These yields were taken during the 11-year period, 1928 to 1938. In both livestock

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HILL CULTURE FOR NATIONAL DEFENSE—AND AFTERWARD

By MAURICE BROOKS [1]

WE are living in times when every pound of food, every dollar of revenue, and every productive effort becomes an integral part of our national effort to secure our own national safety. Particularly significant and valuable is every bit of production of food. Not only must we find new sources to supply our present needs but we must also look ahead to the time when a war-weary and starving world will turn with out-stretched hands to America, asking for food and for the materials with which to rebuild their shattered civilizations.

These needs make it necessary for us to explore every means to find or create new ways to use wisely our natural resources. It is with such exploration and creative effort that "hill culture" is primarily concerned.

That we have the hills no one can deny. That we are receptive to suggestions for improving those hills—their sod or the forests that cover them, their capacity for supporting more domestic or wild animals, their yield in cash income for the owner—will be evident to anyone with a discerning eye who travels our roads. Here can be read the story of strip-cropping, contour furrowing, spot planting, and other steps in the program for conserving our basic resource, the soil.

Thousands of our farmers are taking steps—and important steps they are—to improve their soils and to conserve their water supplies. In West Virginia there is a program for getting 9 million acres of land that is suited only to the growing of trees into forests—forests that will be productive not this year only, but every year. The State Conservation Commission, the United States Forest Service, and the Division of Forestry of West Virginia University are united in the effort to put our forest lands on a sustained yield basis, the only basis from which the landowner can expect a steady though sometimes small income, and the only way in which the State's great wildlife resource can be used and preserved.

"Hill culture" is designed primarily to fit into these larger programs in a supplementary capacity. Its immediate aim is to select and utilize superior strains of erosion-resisting plants of high economic value so that sloping land too steep for cultivation, often too steep for terracing, will not be washed away.

Let us look briefly at some of the steps in the "hill culture" program, each one perhaps small in itself, but each capable of becoming a unit in a mighty whole.

For the last several years we have been mourning the passing of the American chestnut, our most important source of hardwood lumber, our finest game food, and the means to a certain source of extra spending money for thousands of people.

In recent years I have occasionally seen cars from Indiana, Tennessee or some other southern or western State, pulled up along West Virginia roads and offering for sale (at 25 or 30 cents the pound) good-looking chestnuts which neither in flavor nor appearance were much different from our native nuts. These were Chinese chestnuts, grown on trees that are largely resistant to the blight which swept away our American trees. Chinese chestnuts are in no sense a complete replacement for our own species. The trees do not grow, ordinarily at least, to timber size; they are still expensive, and the nuts are not quite up to the quality of our own. Nevertheless, they are good to eat; they sell well, and the trees will live, thrive, and produce good crops in many parts of West Virginia. Furthermore, they have one distinct advantage in that they bear at an early age; good crops can be expected within 10 years or less.

I believe that a few trees of the Chinese chestnut will be a good investment on West Virginia farms, particularly in the Ohio, lower Kanawha, lower Monongahela, and South Branch Valleys, and in the eastern panhandle region. Despite high initial cost they give every promise of succeeding and bearing well at lower altitudes. At Oglebay Park in Wheeling, may be seen bearing trees that produce, and produce well, annually. At elevations much above 1,500 feet I would plant with caution, and on an experimental basis. At our French Creek farm (elevation 1,700 feet) we have had Chinese chestnuts under cultivation for about 25 years, and the history of the planting is that the trees have done well in ordinary years, have even produced some fair crops, but when we have a winter of unusual severity—that of 1935–36, for example—the trees apparently become weakened to the extent that they are heavily injured by blight during the following summer.

For a number of years the College of Agriculture of West Virginia University has been collecting and

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Pickers stripping fruit of lowbush blueberries, **Vaccinium angustifolium.** *Note dense cover, an erosion control advantage. Many high elevations of West Virginia are covered by this species and the fruit is collected annually by thousands of persons.*

planting nuts from chestnut trees that have shown some resistance. A surprising number of these has been reported in the State, and persons knowing of such trees will be doing a public service in reporting them to Dean C. R. Orton at Morgantown. Hundreds of these seedlings are now growing on the University farms, and some of them have indicated considerable immunity to the blight.

An important part of the planting program being carried on by the Soil Conservation Service consists of efforts to establish and encourage stands of our native black walnut. The excellence of this nut needs no tribute from me, nor can there be any doubt about the salability of the kernels. Many native trees, however, bear nuts with thick, hard shells, making cracking difficult and resulting in a slow extraction of the kernels, with a broken and unsatisfactory product. Many persons have felt that the return did not justify the effort, and untold thousands of bushels of black walnuts have frozen on the ground, a completely wasted farm product.

There are several things that can be done about this. Walnut trees, when grown from seed, do not come true to the parent stock, but there is good evidence that seed selected from good trees will tend to produce better nuts in the offspring. Every person raised on a farm will be aware that there is great variation in the flavor, size, and cracking qualities of nuts borne on different trees. Careful selection of seed nuts therefore would seem well worth while.

Several of the finest native walnuts ever discovered have been named and placed in cultivation. These varieties, available from various nurserymen, produce nuts of high quality, thin shells, and excellent cracking qualities. When a market is once established they command premium prices; the trouble has been that the public has not come to recognize their advantages. This will change when enough of these improved walnuts are grown within the State. At French Creek, Upshur County, a variety known as the Thomas walnut has been particularly successful, the trees of rapid growth and of good bearing qualities, and the nuts superior. Stabler and Ohio are also good varieties of established reputation, and available from dealers. There are a number of newer varieties of great promise. Although the nursery-grown trees are expensive (they have to be grafted) they are, I believe, an excellent investment.

Thousands of pounds of European filberts used to be imported into the United States, the chief sources of supply being Spain and Italy. Most people are not aware that this larger relative of the native hazelnut can be grown easily and profitably in West Virginia. Filbert bushes planted at French Creek 20 years ago

have produced large crops, and have seldom had complete crop failures. Nuts produced locally are of excellent quality, and are, seemingly, as good for all purposes as the imported ones. One caution: the bushes are largely self-sterile; that is, they require other bushes for cross-fertilization. Good results can only be expected where two or more varieties are planted together. Barcelona, Duchilly, and Italian Red have all been good bearers in Upshur County. Occasionally early blossoms have been killed by frost, but none of the bushes has shown winter injury.

Other nuts have considerable value. English walnuts can be grown successfully in the latitude of our eastern panhandle of West Virginia, but it is well to remember that these trees are at home only on limestone. They should not be tried in acid soils. There are good improved hickories on the market, and an established market for the kernels, but the trees are of such slow growth as to discourage most people. The products of hybridization between native hickories and pecans, called "hicans," are available to the public. Nuts are excellent, but the trees are little more hardy, so far as producing crops is concerned, than the true pecan. They might produce well in the lower Ohio Valley.

Every season the Forest Service opens up parts of the Monongahela National Forest to the blueberry pickers, thousands of whom flock to Roaring Plains, Red Creek Plains, and other sections to pick the small, but luscious, fruit. They have keen competition from bears, and ever-present is the thought of a lurking rattlesnake, but the pickers go anyway. I never see anyone picking blueberries without thinking of the beautiful berries developed through selection and hybridization of native blueberries by the late Dr. F. W. Coville. These berries, first grown at Whitesbog, N. J., are now to be had in a number of varieties. Some grow on low, matted bushes; others have bushes that reach a height of 4 or 5 feet. Dwarf bushes have done well in recent experiments at the University of West Virginia where efforts are being made to develop plants of this type. The fruit on all types of bushes is large, some of the berries being grape-size, and of high quality. Some varieties are especially adapted to acid swamps; others do well on the same acid soils as are required by rhododendron and mountain laurel. The bushes are handsome, are well adapted to the home garden, and the berries have ready sale. A few bushes, well-selected, will furnish berries for a family throughout much of the summer season. This is a fruit that deserves a much wider planting than it has received in West Virginia. It may well be used to supplement the farm income.

On the hills overlooking the Tennessee River the TVA agencies have encouraged the extensive planting of Japanese persimmons. These fruits are much larger than, and not so astringent as, our native persimmons, and should be hardy up to 1,200 feet in West Virginia. Since a market for them is being developed in the Tennessee Valley region, the lower Ohio Valley would seem to be strategically located for such plantings.

One of our most neglected resources and one which holds the very essence of "hill culture," is to be found in our stands of sugar maple trees. Maple sugar and sirup give flavor to some of the most popular food products in the world—on the farm one of our deepest satisfactions was to be found in the "bilin' down" and the "sugaring-off." In a few sections (the region around Mt. Storm, Grant County, is notable) farmers are making extensive use of maple sap for sugar and sirup.

Every Christmas I see what is to me a rather pathetic sight. In front of the grocery stores, and in the gift shop windows are boxes and barrels of holly, scrawny stuff from New Jersey or Delaware, with drying leaves, scattered pale berries or no berries at all, their places being taken by wired-on artificial atrocities. And despite this—so ingrained is our feeling that holly is appropriate to the Christmas season—the stuff sells, and at good prices.

Then I think of the magnificent American holly trees that I know in Upshur, Braxton, Nicholas, Fayette, Wyoming, and other counties in West Virginia; trees of lovely form and foliage, bearing annual crops of berries in such profusion as to make one who has not seen them before gasp in astonishment. I remember, too, one tree that has been trimmed—and in some cases butchered—each year for 60 years—so my grandfather told me—and yet produces such unbelievably loaded twigs as I have never seen elsewhere.

Skillfully trimmed, a holly tree will go right ahead producing bearing woods, and crops of berries, year after year; in fact, the trimming may do the tree good. I can see no possible reason why the stores in Clarksburg, Charleston, Huntington, and Wheeling should import New Jersey holly. We have it at home in adequate quantities, and in quality far beyond anything that finds its way to the commercial market in the seaboard States. What we need at present is a realization on the part of the landowners that this market exists. When the true value of a good holly tree is realized the owner will protect it as he would any other desirable property. I believe that I know

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KING GRASS RETURNS TO THE KINGDOM OF CALLAWAY

By PHILIP K. HOOKER AND CLEO H. STATTON [1]

GRASS lands once made Callaway County, Missouri, so prosperous and independent that it was often referred to as the "Kingdom of Callaway." A history of this county, published in 1884, states that, "Callaway County comes very near to being a stock breeder's paradise, the demand for all classes of well-bred stock always being in excess of the supply * * *. Not a single man of ordinary sense and business capacity in this county that has followed the one work of raising and feeding his own stock, abjuring speculation, and sticking closely to the business, has (or ever will) failed to make money. It beats wheat growing two to one, though the latter calling be pursued under the most favorable conditions in the best wheat regions. It beats speculation of every sort, for it is as sure as the rains and sunshine. What are stocks, bonds, options, mining shares, merchandise, or traffic of any character beside those matchless and magnificent grasses that come of their volition and are fed through all the ages by eternal God, upon the rains and dews and imperishable soils of such a land as this? * * *. By the side of the herds and grasses and herdsmen of such a country as this, the men of the grain fields are nowhere."

But "men of the grain fields" appeared later. During the first World War many of the farmers of Callaway County did not "abjure speculation" nor did they "stick closely to the business" of stock raising. Wheat was in great demand. Virgin grass lands on soils and slopes not suited to cultivation were plowed up. Corn, oats, and wheat sapped the fertility of the land, and erosion began to take its tremendous toll on those "imperishable" soils. Farms were divided, by sale of parts of them, into two or more farms. The result was a large number of small farms. Today many farms have only 40 or 80 acres—the average of all farms is about 118 acres. The County Land Use Planning Committee considers 160 to 175 acres about the minimum needed in the area to provide an adequate living. To try to make a living in this area from a farm of less than that means, generally, misuse of the land with resulting erosion and ultimate ruin of the soil.

Ruined land ruins the people on it. As prices of farm products declined, the farmers worked the soils still harder in an effort to meet interest on mortgages, increased equipment expenses, and to maintain some semblance of a decent standard of living. The droughts of 1934 and 1936 brought a climax to a situation which was already seriously affecting the agricultural economy of the area.

Typical of the pasture land that will be revegetated in the Cedar Creek forest and pasture area.

Naturally, this situation came to the attention of the Department of Agriculture and, in the summer of 1935, a soil conservation demonstration project and a CCC camp were established in Callaway County to cope with the problems. It was soon realized, furthermore, that some means would have to be found to supplement these eroded farms from which the operators could not make a living. The only measures deemed adequate to stabilize the economy of the area were (1) public purchase of some of the farms that had become most submarginal, and (2) improvement and management of the acquired lands for the benefit of the community—such measures to be supplemented by continuous encouragement of conservation farming by the operators of the remaining private lands. Accordingly, the Secretary of Agriculture on January 11, 1939, approved the establishment of the Cedar Creek Pasture and Forest Project under the provisions of Title III of the Bankhead-Jones Farm Tenant Act. This project embraces a total of 258,820 acres, of which about 90 percent is in Callaway County and the other 10 percent across Cedar Creek in the eastern edge of Boone County.

The Soil Conservation Service is acquiring, with funds made available to date, 12,913 acres in 21 separate blocks located throughout the west half of the project area. The average price paid per acre,

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including improvements, is $8.53 for the lands being acquired at present, and the average size of the farms is about 110 acres. The purchase of an additional 10,456 acres in the 21 blocks and 1,720 acres in two other locations is considered essential to effect fully the needed adjustments in the present purchase area of the project. This will make a total purchase of 25,115 acres, about 20 percent of the total land in this half of the project. The ultimate size of the blocks of land to be acquired in any one location will vary from 350 acres to approximately 2,600 acres, depending on the extent of the problem of submarginal farms in the location and needs for additional grazing lands by the remaining farms.

Purchases are made on an entirely voluntary basis. No one is being forced to sell his land. Sufficient farms qualifying for purchase under the act, i. e., "submarginal or not primarily suitable for cultivation," either are or will be for sale in the area, at the fair appraised prices which the Government pays, to enable the working out of the contemplated adjustments in land use without requiring any individual to sell his land unless he wishes to do so.

As the lands are acquired, and as funds are made available for the purpose, they are improved and protected from continued erosion. On those formerly cultivated lands best adapted to pasture, particularly those which will respond properly thereto, seed beds are prepared, limestone and fertilizer are applied, and seedings of legumes are made, to be followed by perennial pasture grasses. Gullies—and there are many in the area—are "bladed-in"; or other measures are taken to arrest their further damage and to bring the land back to useful condition. Lands already in permanent pasture are improved by various means according to the needs and the quality and condition of the soil, including interspersed seeding, liming, fertilizing, and mowing weeds and cutting brush. Fences are constructed to control the grazing that is to be permitted on the lands, as well as to protect the cover seeded or planted on badly eroded areas until it is well enough established to be used for grazing. Stock water is provided where needed by the construction of small ponds or development of springs at strategic locations for proper distribution of the cattle that will graze the lands.

Lands having a good growth of trees are allowed to remain as woods while open or brush lands not adapted to pasture use are planted to desirable species of tree seedlings and wildlife cover shrubs. Some thinnings and other woodland improvements are made and all lands are protected against fire.

These conservation operations are being carried out at present by the employment of farmers and other rural occupants of the area. This employment furnishes these people some much-needed cash and, at the same time, gives them first-hand experience in some of the conservation practices needed on their own farms.

As the grass cover is restored on the lands, permits are granted, at reasonable charges, to farmers in the vicinity of the various purchase areas to use the land for grazing purposes. Likewise, as condition of the woodlands warrants, permits will be granted to rural families to cut fuel, posts, and other timber materials. Permits are granted according to the needs of these farmers. A farmer having a farm of submarginal or marginal character because of size, condition of land or otherwise, and whose chances of making a decent living could be improved by raising some livestock or increasing his present small livestock herd, is given first preference in the granting of permits. Farmers granted such permits agree to conservation plans for their own farms. This last mentioned factor contributes materially to more rapid stabilization of the entire area, both physically and economically, by adoption of proper soil conservation practices and land use on the private lands as well as the public lands.

For a concrete illustration of the problem, the procedure followed and the objectives to be attained, let us look at one representative segment of the project comprising 23 farms totaling 3,590 acres.

Only 6 of these farms had the acreage recommended by the County Land Use Planning Committee as essential to provide a decent family living, namely, 175 acres. The average size of these 6 farms was 314 acres, varying from 196 to 583. By contrast, the other 17 farms varied in size from 22 acres to 160 acres, and averaged only 100 acres.

Of the 3,590 acres in this segment of the project, only 888 acres, or 25 percent, of the land is suitable for cultivation as revealed by the use-capabilities classification which is based on a detailed conservation survey of the area. Of the 888 acres, only 168 acres is class I land, requiring no special soil conservation practices; the other 720 acres is class III land, requiring complex or intensive erosion-control practices, if the land is to be cultivated Moreover, of the 168 acres of class I land, 59 acres are in woods, and 47 acres of the 720 acres of class III land is wooded. It is feasible to clear woods from land in this area only in limited instances. Consequently, the amount of land which can be practicably cultivated is only 782 acres, or 22 percent.

In 1938, because of the small size of the average

This road may be abandoned in consequence of land purchases in the Cedar Creek forest and pasture area, thus saving the county expense of road maintenance.

farming units and the type of farming followed, 1,169 acres of land that is adapted only for use as pasture or woods was being used for crop production. This is 33 percent of the segment and the result is that there is much erosion in the area.

With such pertinent facts at hand, these 23 farms were classified according to their marginality—their ability to provide a satisfactory family living. Only the 583-acre farm could be classed as supermarginal, capable of returning a good income in unfavorable years. Seven farms were of the marginal class, i. e., capable of providing an adequate income only under favorable price and climatic conditions. The other fifteen farms were definitely submarginal or incapable of providing a decent family living even in "good times."

While all of the fifteen submarginal farms would have qualified for purchase under the act, only eight of them were selected for purchase—the ones offering the least opportunities for rehabilitation. These eight farms had a total of 825 acres, with an average of only 103 acres per farm. Of the 825 acres in the eight farms, only 123 acres, or 15 percent, is suitable for continuous cultivation. On the other hand, of the 2,765 acres in the 15 farms to remain in private ownership, 765 acres (28 percent) can be continuously cultivated safely with proper practices. Of the 123 acres adapted to cultivation in the eight farms selected for purchase, 32 acres (26 percent) is in woods, as contrasted with only 8 percent for the same kind of land in the other 15 farms.

While this segment of the project is probably more representative of the project as a whole than any other, the land acquisition and conservation operations in this segment are not quite as advanced as in some others. Only three of the eight farms selected for purchase actually have been purchased as yet. These three, totaling 338 acres, had been abandoned. The operators had given up the futile attempt to make a living from them. However, with completion of the acquisition and conservation operations work, a community pasture of 640 acres, and woodland of 175 acres, will be available to the eight remaining operators of submarginal farms and the seven operators of marginal farms. This will be of extreme importance in enabling these operators to increase their size of business and to work out adjustments in type of farming and character of operations so that they may have an improved basis for making a decent living.

Now, from these 15 farms that are to remain in private ownership in this segment of the project, let us take a more specific look at one of them, say the 160-acre submarginal farm belonging to a man we will call John Adams—we "sat in" when a conservation farm plan was drawn up for John's farm.

John has a large family. He found that, with only 160 acres and the way he was farming it, he could not make a decent living from the farm alone, so he works out a large part of the time.

At present he has only 2 horses, 2 dairy cows, 2 brood sows and about a dozen hens. The farm comprises only 24 acres capable of standing continuous cultivation, although it does have 28 acres that can be used for permanent meadow—or can even be

cultivated for a short time at long intervals. Under his present "plan" he is growing 15 acres of corn for grain, 10 acres of small grains, 4 acres of sorgo and 18 acres of lespedeza hay. He is losing $66 annually through the operation of his farm, and furthermore the farm is running downhill both figuratively and literally.

Under the farm conservation plan, if carried out, John will increase his animal units from about 5 to 35. The principal increase will consist of 15 beef cows, 3 beef heifers, 11 beef yearlings, 30 ewes, and 30 lambs marketed at 4 months of age. His crops will be changed to 6 acres of corn, 6 of small grains, 7 of lespedeza hay and 24 of mixed hay.

He will have 103 acres of pasture of which 79 would be open and 24 with scattered woods and brush. The plan calls for improvement of the pasture by liming and fertilizing with superphosphate, as well as grass seeding of some formerly clutivated land. All of the crop land will have to be terraced. Even after this plan is fully effected and his farm productivity restored, he will need about 30 animal unit months of grazing in the community pasture previously mentioned.

During the 10 years that it may take John, with his limited financial resources and average ability, to put this plan into full effect, he will need 68 animal-unit months of grazing in the community pasture. In other words, only through use of the community pasture developed on federally acquired lands, can John make the needed adjustments in his farm operations. This is especially true for John Adams and the other seven operators of submarginal farms in this segment of the project and is also true, but to a slightly lesser extent, for the seven operators of marginal farms.

It is estimated that when John gets this new farm plan into full operation, his annual net earnings from investment and management will be increased from the present minus $66 to a plus $617. He will be able to work at home full time, instead of away from home most of the time. Moreover, he will be building up his farm instead of allowing it to pass the stage of practical rehabilitation as it would soon if his present system of farming were continued.

Projecting such an adjustment as outlined for John Adams' farm to the other 22 farms in this segment of the project, it appears that the animal units for the 23 farms can be increased, through the project program, from 330 to 489; and the gross farm income can be increased from an estimated $15,600 for the 23 farms to $30,700, or 97 percent.

It will be realized that such a program as the one outlined here cannot be accomplished "overnight," or seldom in one or two years. Most of the ground work may be done in two or three years depending on the availability of funds for land purchase and for conservation operations on the lands acquired. However, some phases of the adjustment, notably any needed changes in the type of farming by individual operators to remain in the area, must often evolve over a period of several years, depending on the abilities and resources of the various operators, and the use made by them of the credit and other assistance programs and facilities, local, State, and Federal.

Much progress has been made in this project, and individual farmers are recognizing the value of the program and cooperating in effecting it. At the same time, it must be recognized that such progress would be more adequate and rapid if there existed in the area an organization of farmers for cooperatively effectuating, with proper authority, the basic soil conservation and land-use adjustments in their own right and name.

The problems, and the handicaps in solving them, are being overcome to quite an extent by the excellent cooperation of the community which seems to recognize that its "bread and butter" is dependent upon the stabilization of its agricultural economy. Such stability is being effected through restoration of the "matchless grasses" that will again make the "Kingdom of Callaway" a "stock breeder's paradise" and keep its "imperishable soils" from perishing; that will bring back "the men of the grain fields" from "nowhere" to the security their families need, deserve, and can have by "sticking closely to the business" of stock raising

FACTS ABOUT CONSERVATION FARMING

(*Continued from p. 269*)

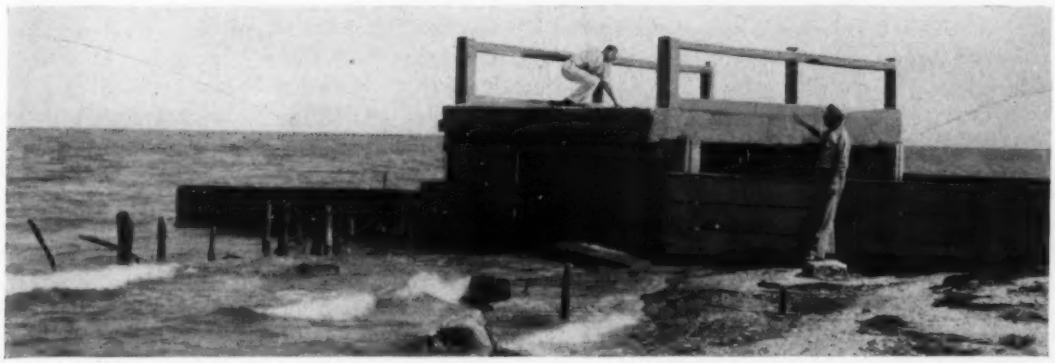
and grain systems of farming, the yield of corn that followed red clover sod in the rotation averaged 11 bushels more per acre than did corn following corn.

The Illinois State Agricultural Experiment Station found that one acre of untreated good Corn Belt land produced as much as 7 acres of the poorest untreated land for the period 1910 to 1938. These results were secured when appropriate rotations were used on both types of land, but no soil treatments were added.

These factual data are presented from different sections of the country to show that conservation farming, including proper land use supported by needed soil conservation measures, reduces runoff and erosion and insures immediate and continuing increases in crop yields. While increases of the same magnitude cannot be expected for all locations, nevertheless farmers who have applied conservation measures on their farms have experienced increases in crop yields.

SHORE EROSION ON THE CHESAPEAKE

By JOHN COTTON [1]



Automobiles once crossed a small stream via this bridge which now is left standing in the Chesapeake Bay.

Shore where retaining wall is to be built. Old wall which was destroyed was about six feet from present shore line. Sea wall was constructed by the Harwood CCC camp under guidance of the Soil Conservation Service.

THE ever pounding action of waves has long played havoc with the banks along 3,600 miles of shore line on the Chesapeake Bay. There are places along the bay shore where tides surge unrestrained above sunken tombstones that once stood in family burial plots, places where the waves roll over the ruined remnants of foundations that once supported homes and barns. In one place along the southern extremities of the western shore a concrete bridge built for automobiles stands out in the bay—it once crossed a stream that outletted beyond it into the bay.

Farmers on lands adjoining the bay shore have for generations watched their banks give in to the fight against the waves. One dramatic symbol of the water's victory, off Tighlmans Island, is the brick lining of what was rather recently a fresh-water well now left standing out in the bay. Farmers owning much land along the shore front often lose as much as an acre of land a year, or, as expressed by Walter Denny on Kent Island, "one turning row a year" (about 8 feet) along his whole bay front.

Families from urban areas close by, especially Baltimore and Washington, have found the bay shore an excellent vacation land especially for week-ends and have purchased waterfront property. Thousands have built summer homes. They, too, have found that each heavy storm takes another bite out of their land. The investment and improvements attached to these summer resort properties make the problem even more important, and more costly than the loss of agricultural lands.

Occasionally a hurricane sweeps up the coast. This ruthless invader can be counted on to rip out and wreck the shore line like a Panzer division smashing through infantry.

The famed oystermen, known the world over for their excellent sea food, complain of the erosion along these banks, not because of the soil covering their oyster beds, but because the muddy waters that lie over these beds do not permit a sufficient amount of light to trickle through to the oyster, or more important, to the microscopic organisms upon which it feeds. These poorly developed organisms or lack of organisms affect the normal growth of the oysters.

Countless attempts have been made to stop the washing by these waves. Some have reached a reasonable degree of success, not necessarily permanent, but at least to the extent of arresting the waves for several years. One of the most noticeable attempts to control shore erosion was carried out by the Harwood CCC Camp several years ago under the direction of the Soil Conservation Service. In this instance a sea

[1] Extension soil conservationist, University of Maryland and U. S. Department of Agriculture cooperating, College Park, Md.

wall 4 feet in height was constructed out of heavy planks for a distance of 1,000 feet along Deale's Beach. Eight-foot piling, 4 feet of which was driven into the ground with a home-made pile driver, was used for supports. The banks were then sloped to meet the wall at an approximate 4–1 slope. Today the wall is being used as a demonstration of a design approaching what appears to be the ideal, although it is considered by those most familiar with it that the height of the wall should be reduced to 3 feet, making it less expensive to construct and less vulnerable to the power of the waves. In addition, the banks probably should be sloped back at a little less grade, to prevent further damage by high waves.

It is upon the methods used by those who have been reasonably successful that the Soil Conservation Service and the University of Maryland have based some experiments, as well as upon improved recommendations. However, any recommendation or suggestion included in this article should not be thought of as being a permanent method, but one better than the usual method.

Sea walls.—One of the most common mistakes in building sea walls along the banks is failure to put in the footing at a sufficient depth below the point of low tide. This mistake is easily understood in that a great many of those building such a sea wall endeavor to locate the wall away from the waves—they place the structure next to the bank. In so doing, they do not take into consideration the slope of the beach, and as a result the wave action at low tide will often remove this beach between the wall and bay, leaving the footing exposed so that the sea wall soon topples into the bay.

In building a sea wall it is very important to figure the depth of the footing in relation to the low tide point, and not in regard to the depth in terms of dirt removed at the point where the wall is located.

Sea walls and vegetation.—Vegetative control methods in conjunction with structures have rarely been used. The general failure not to do this has made the usual sea wall more costly and much more vulnerable to the action of heavy waves. Vegetative erosion control offers elasticity that can not be duplicated mechanically, but of course it will not withstand constant wave action.

The more ideal sea wall design, as concluded in the study made along the bay front, is one that combines the sea wall with vegetative protection. In doing this the wall should be low, generally not more than 2½ feet in height on the Chesapeake Bay—just high enough to take care of the everyday wave action at varying tides. The bank should then be sloped to meet the wall at a 6–1 slope or less. In this way the wall is backed up by the bank, has less surface exposed to the wave action during storms, and the high waves suspend themselves on the sloping bank above where the vegetation offers very little resistance to the wave but does hold the soil of the bank in place.

No vegetation could withstand such an action every day. But on the Chesapeake Bay where storms are not frequent and where the vegetation has opportunity to recover after such a pounding, this method of shore erosion control should prove to be stronger and generally much less costly.

This type of control of shore erosion generally requires maintenance following heavy storms. Where the vegetation is washed out or destroyed, it should be patched up so that the dirt behind the wall is always intact.

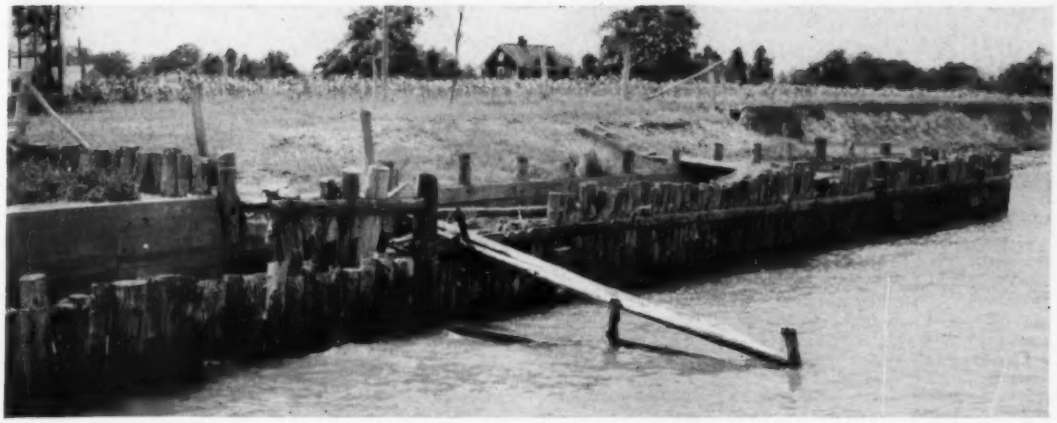
Many types of vegetation are good. Many of the bent grasses do as well in sand as any grass. Crabgrass also does well, although it does not offer much cover during the winter months. Bluegrass is as good as any if proper soil conditions prevail.

Bushes of any type found growing nearby likewise do well. Rose bushes lend themselves particularly well to such a purpose.

Vegetative practices.—Several attempts to stop bank losses by vegetative methods have been made by farmers owning long shore fronts where the lands are not of sufficient value to justify any very costly method of shore erosion control. Protection of the bank alone by vegetation in most cases does not work. The principle that should be adhered to in working with vegetative control is the building up or maintenance of a beach to suspend the wave action instead of allowing it to pound against the banks.

An interesting example of how a farmer followed this principle is seen on Tighlmans Island. By planting two rows of smooth cordgrass (*Spartina alterniflora*) in the sand, in clumps eighteen inches apart each way and at a good depth during low tide periods, this farmer established a good vegetative control practice. This grass can grow in water, withstands a brackish condition, and will spread. Through this method he has succeeded in building up a beach more than 300 feet in length and has extended it into the bay 10 or 15 feet in the past 10 or 11 years without any cash outlay, as the grass was transplanted from a nearby saltwater marsh.

This practice cannot be recommended generally, as similar attempts by other farmers in different localities have failed because their conditions were not so



Home-made shore erosion control by jetties, seawalls and piling; St. Marys County, Md.

favorable for establishment of the grass. The practice seems to work best when there is a gradual slope of the land in the bay away from the banks, making the water relatively shallow where the grass is planted. If such a planting is to be made, there should be three types of plantings, as outlined below, if the plants or grasses can be found close at hand and transplanted.

1. A planting in the bay itself at low tide. The only plant known now that will withstand this condition is *Spartina alterniflora.*

2. A planting along the beach, which may be any of the following:

Spartina cynosuroides (big cordgrass)
Strophostyles helvola (beach bean)
Spartina patens (salt meadow cordgrass)
Cynodon dactylon (Bermuda grass)
Festuca rubra (red fescue)
Panicum amarum and *P. amarulum*
Panicum virgatum (switchgrass)
Solidago sempervirens (beach golden rod)
Local rushes and any other active material

3. A planting along the bank should be made to help establish and protect it, using any of the following:

Rosa wichuraiana (memorial rose)
Hemercallis fulva (day lily)
Lonicera japonica (Hall's honeysuckle)
Parthenocissus quinquefolia (Virginia creeper)

Any situation that tends to build up a beach by causing the sand to filter out, as in the vegetative control method, is desirable. Jetties are among the most effective methods of this type.

Increased emphasis on vegetation entering into the control of the shore erosion problem offers a real possibility toward solutions to many of the problems. To what extent vegetative control can be relied upon is still unknown; but it is certain that vegetative control methods used with or without mechanical structures materially reduce costs, and in the majority of instances when properly applied they increase the strength and the permanency of the control measure.

BIG-SCALE DEMONSTRATION OF PUTTING SOIL CONSERVATION ON THE LAND

By ERNEST CARNES [1]

HARRY W. Shealy's farm in the Lower Saluda Soil Conservation District in South Carolina was the scene, last November 5, of more different kinds of farming activity than usually can be found on the average farm in an entire year. More than 1,200 farmers tramped over the 225-acre farm during a one-day complete soil conservation demonstration designed to show every step in setting up a sound, coordinated conservation program on the land. The demonstration on the Shealy farm was arranged especially for farmers in the Piedmont section.

A week later, on November 12, a similar demonstration was held on the Ira B. Newsom farm in the Lynches River Soil Conservation District for farmers in the Coastal Plain. Farms are larger in the Coastal Plain and farmers are fewer in a given area. But the 700 farmers who attended the latter demonstration

[1] State Coordinator, Soil Conservation Service, Spartanburg, S. C.

At the beginning of the demonstrations farmers were told about the district conservation plans for the two farms and given an opportunity to ask questions. Here State Coordinator Ernest Carnes explains land use changes and soil conservation measures contemplated for the Newsom farm.

were no less outspoken in their opinion that the event was a big success.

"Let's all return to this farm next year on a convenient date to see the progress that has been made" was the comment not only of the district supervisors and representatives of cooperating agencies, but of the farmers themselves.

Automobiles loaded with farmers began arriving about 10 a. m. and groups of 50 to 100 were quickly formed, each with a designated leader from one of the cooperating agencies. As each group was organized, a speaker on a sound truck explained the farm plan with the aid of a large map and the trek over the farm began.

Representatives of the South Carolina Agricultural Extension Service, the South Carolina Commission of Forestry, and the Soil Conservation Service, who cooperated with the supervisors in arranging the program, were stationed at each demonstration point and led the discussion as groups moved over the farm with clocklike regularity.

Special emphasis was placed on the food for freedom angle of a district farm plan with demonstrations of such practices as pasture improvement, establishment of annual and perennial grazing and hay crops, development of a farm fish pond and an irrigation system for the farm garden. Extension specialists led discussions on construction of a milk cooling box for the farm well, a drinking trough for the pasture, a box silo, hay-curing rack, and potato hack.

On cultivated fields, the demonstrations included setting up sound rotations, strip cropping, construction of terraces, establishment of meadow outlets; also, development of border strips for wildlife between fields and woodland by releasing native shrubs at the edge of the woods and seeding a strip of sericea lespedeza adjacent to the cultivated land.

Woodland phases of the program were discussed and demonstrated by forestry representatives of the cooperating agencies. These included the development of fire lanes, tree planting, thinning, and methods of cutting and selling mature timber to the best advantage. The foresters also gave demonstrations of fence-post treatment.

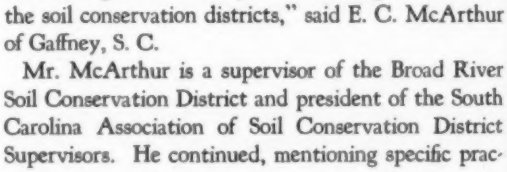
Much of the success of the demonstrations was due to excellent planning. Technical committees of the various agencies assisted the district workers in developing a farm plan for each of the two farms. Enrollees from the Newberry and Goldville CCC camps spent several weeks carrying out the preliminary work on pastures, fields, and woodland, but leaving the final completion of the work until the day of the demonstration.

County agents, vocational teachers, FSA supervisors, and other local agricultural leaders took an active part in setting up groups of farmers and vocational students from surrounding counties and arranging transportation to the demonstration. Newspapers and radio stations cooperated in carrying advance stories and radio programs through arrangement made by Extension Editor A. B. Bryan.

Governor Burnet R. Maybank, taking cognizance of the importance of the soil conservation district program in the State, proclaimed the week of November 3–8 as South Carolina Soil Conservation Week, calling special attention in his proclamation to the two soil conservation demonstrations.

"This type of demonstration where farmers can see for themselves in a single day a variety of sound soil conservation measures being established on the farm should help tremendously in facilitating the work of the soil conservation districts," said E. C. McArthur of Gaffney, S. C.

Mr. McArthur is a supervisor of the Broad River Soil Conservation District and president of the South Carolina Association of Soil Conservation District Supervisors. He continued, mentioning specific prac-



After observing one soil conservation practice the farmers were escorted in groups to the scene of another practice until they had seen all the practices. Here a group is looking at the newly established strip cropping pattern on the Newsom farm.

tices, "I also feel that the districts, through such demonstrations, can be of greater help to the food for freedom program. Pasture improvement work, the establishment of meadow strips, and greater use of perennials such as kudzu and sericea lespedeza as a permanent source of hay, which were demonstrated on the two farms, are among the conservation measures that will play an important role in helping farmers to produce more food for our war needs. These conservation measures not only do an excellent job of preventing erosion but also enable the farmer to produce feed for livestock at a low cost, and often on land that is not suited for other crops."

Ordinarily a farmer has difficulty in visualizing a complete conservation program, because even on his own farm it takes several years to change over from the ordinary one-crop system to the new plan of conservation farming. But in the two demonstrations held last fall, South Carolina farmers had an opportunity to see the complete transformation within a single day.

Nearly 2,000 farmers returned home after the two demonstrations with a new conception of conservation farming which otherwise might have taken them years to attain. And district supervisors and agricultural workers alike were agreed that in these two 1-day programs they had hit on a plan that will really speed the development of conservation on the land.

Home-built milk cooling unit using water pumped from deep well, Shealey farm. The milk cans are placed in the barrel, the water turned on, the milk quickly cooled.

The demonstration was equally impressive as an indication of what district conservation farm plans can do to help meet requirements of the food for freedom program. As a result of land-use changes made in carrying out the conservation plans on the two farms, perennial hay and improved pasture acreage was increased sufficiently to double the number of dairy cows on the two farms.

UTILIZATION OF RANGE PLANTS ON WYOMING WINTER SHEEP RANGES

By KENNETH FIERO [1]

SINCE the great drought of 1934, which forced the unprofitable sale of approximately 50 percent of the livestock on the Great Plains, the people of the range areas have been vitally interested in knowing more about their grazing resources and means to maintain them. They wish to know more about the behavior, peculiarities and economic value of plants, methods used to appraise range conditions, and how to judge proper utilization of range plants. This information is necessary for the management of the resources of the western range lands—resources that supply feed for 16 or 17 million animal units each year on the ranges west of the 100th meridian.

Now, with war time demand upon ranges, it behooves conservation agencies and the livestock producers to give greater attention to local conditions, including climate, soil, slope, past use, plant composition, density, etc. One of the principal activities of the Soil Conservation Service in the western United States has to do with helping ranchers improve their range management practices. It is a task that requires use of all available information, and further study, to ensure adaptability of plans to local conditions. This article tells briefly the method we are using to study range utilization in one Wyoming area, a 45,000-acre winter sheep range near Riverton.

Inasmuch as range forage is an annual crop, principally from perennial grasses, its yield can be estimated within reasonable limits by plant growth specialists; but the ranchman needs information concerning the degree to which different forage plants are used by livestock to help him determine the weak points in his range management practices. On winter ranges, a forage inventory, taken before grazing starts, shows the range man how much native forage he has on hand

[1] Associate range examiner, Northern Great Plains Region, Soil Conservation Service, Casper, Wyo.

so that he can pace his operations accordingly. An inventory at the close of the season will indicate whether sufficient plant material is left to maintain plant vigor and conserve soil and moisture, and will also give information on the utilization of different forage plants which may point the way for management changes from time to time.

The proper degree of use that may be safely practiced on the dry browse ranges of the Red Desert of Wyoming, where precipitation is scanty and the poor soils thin and salty, is decidedly different from proper use on the better watered ranges on the glacial till in North Dakota or of the well-grassed ranges in the sandhills. Data obtained in a three-year utilization study on a 45,000-acre winter sheep range east of the Big Wind River, near Riverton, Wyo., have shown the desirability of localizing range information, and thrown new light on the use of some forage plants by sheep in winter on this particular type of dry browse range. The terrain of this purely winter sheep range unit is undulating; elevations range from 5,200 to 5,400 feet. Drainages are intermittent and flow north to the Big Wind River, and the soils are thin, immature residual developments from Tertiary sediments which support a modified mixed prairie association with intermingling shrubby plant communities.

Range operations are conducted according to a management plan prepared after a range survey delineating forage types and showing type acreages, plant composition, forage density and estimated capacities, locations of water, fences, bedgrounds and salting stations, and other pertinent information. In this range study, the volume production rating of each key species of forage plant was determined prior to grazing in the fall, by clipping, sorting and weighing the vegetation from sample plots of 100 square feet each. The same procedure was used in the spring after the stock was removed to ascertain the amounts of forage used from each key species.

Records of actual use of the range, obtained from camp movers and herders who cared for the sheep, included information on the actual number of animals grazed, number of days each bedground was used, and the approximate area grazed from each camp site. Five nights at a bedground was the maximum recommended in the management plan and was exceeded only when severe winter storms compelled it. The following table gives the record of grazing use, and the illustration accompanying this article is a small segment of the range map showing the operation of the management plan and the percentages of utilization of each important forage species.

Numbers of sheep were adjusted in accordance with the variations in the available amounts of forage resulting from year-to-year differences in the amounts and distribution of rainfall. Thus, only 70 percent as many sheep were grazed the second season as during the first, and in the third season only 77 percent as many sheep were grazed as during the first season. The general condition of the range at the end of the evaluation was somewhat better than it was at the start.

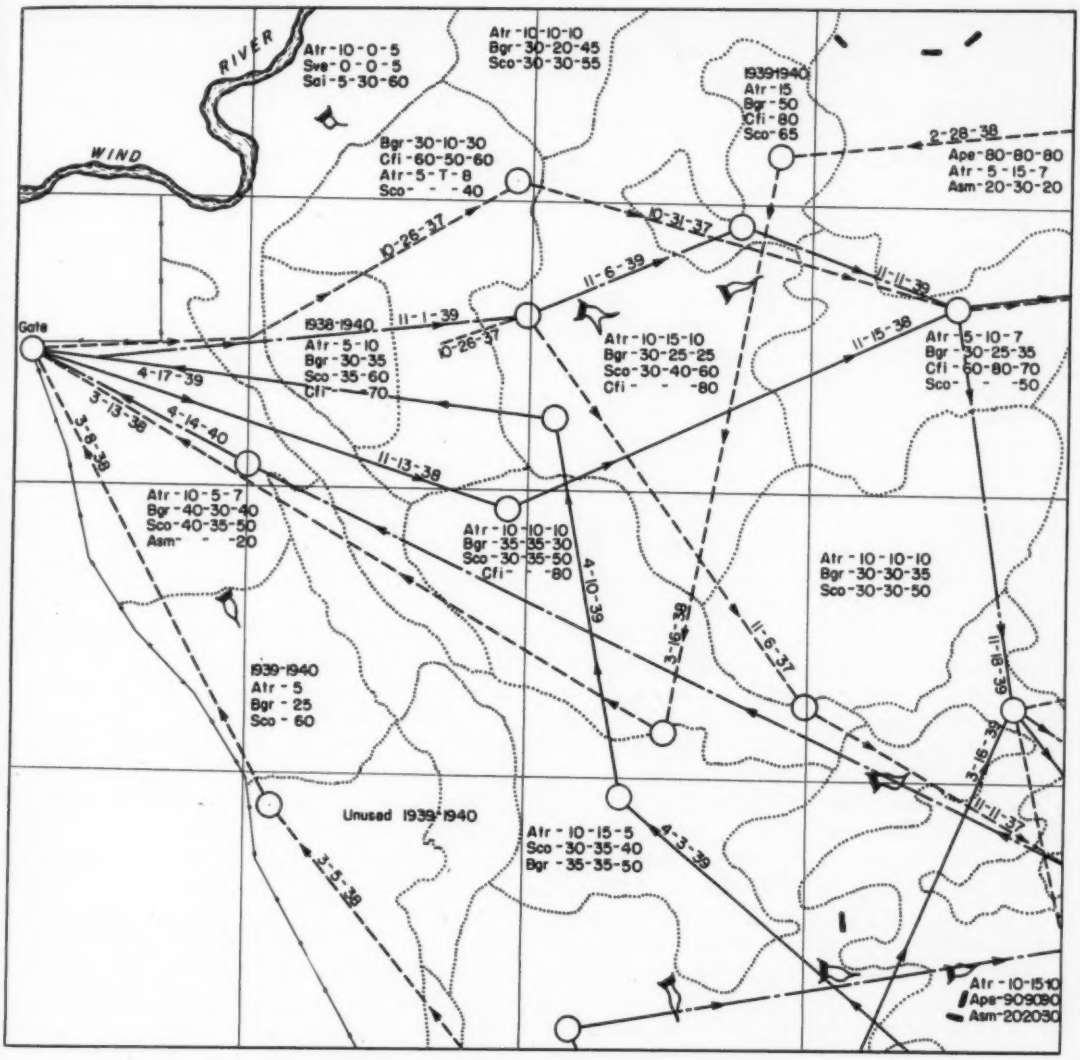
The range survey, and the utilization and forage production measurements of key species point the way to specific recommendations for this range.

Brown sage (*Artemisia pedatifida*), which is a dwarf sagebrush confined largely to small saline areas, and threadleaf sedge (*Carex filifolia*), a grasslike plant commonly referred to as "niggerwool," were preferred by the sheep and appeared capable of maintaining themselves under heavy winter use. On the other hand, the sheep utilized blue grama (*Bouteloua gracilis*) and western wheatgrass (*Agropyron smithii*) far less than expected, although the former, because of its quantity, still is the major forage resource on this range.

Big sagebrush (*Artemisia tridenta*), is the most widespread. It furnished 37 percent of the ground cover but produced less forage—37.4 grams per square foot of ground cover—than any of the other species measured. In addition to its low yield, the quality of forage from big sagebrush is low. Only 10 percent of the annual growth of this species was grazed; this is one-half the amount provided for by the "proper use factors." Brown sage, the least plentiful, furnished only 4 percent of the ground cover but was utilized

Year	Stock entered	Date of arrival	Date of departure	Stock removed	Death loss	Total sheep months
1937–38	4,000 ewes	Oct. 26, 1937	Mar. 13, 1938	3,945 ewes	55 ewes	18,166
	145 rams	Dec. 5, 1937	Jan. 14, 1938	145 rams		
1938–39	2,229 ewes	Nov. 13, 1938	Apr. 17, 1939	2,199 ewes	30 ewes	11,455
	88 rams	Dec. 7, 1938	Jan. 15, 1939	88 rams		
	200 antelope*	Dec. 15, 1938	do	200 antelope		
1939–40	2,400 ewes	Nov. 1, 1939	Apr. 15, 1940	2,350 ewes	50 ewes	13,306
	80 rams	Dec. 10, 1939	Jan. 15, 1940	80 rams		

* Number of antelope and period of use only approximated.



Common Name Of Plant	Symbol	Percent Utilization By Years		
		1938	1939	1940
Big Sagebrush	Atr	5	10	15
Thread-Leaf Sedge	Cfi	50	60	10
Blue Grama	Bgr	30	25	20
Needle-And-Thread	Sco	30	30	55
Grease Wood	Sue	0	0	5
Alkali Dropseed	Sai	5	10	15
Western Wheatgrass	Asm	20	25	25
Brown Sage	Ape	90	90	90

LEGEND

- Stock Water And Erosion Control Dam
- Camp Or Bedgrounds (Salting)
- Route Followed 1937 - 1938
- Route Followed 1938 - 1939
- Route Followed 1939 - 1940
- Water Spreading Dike
- Type Lines

Segment of range management map of winter sheep range near Riverton, Wyo. It illustrates the way forage types and plan of use were outlined for the benefit of the range user.

to the extent of 80 percent of its annual growth, as compared with a tentative "proper use factor" of 10 percent.

Needle-and-thread grass (*Stipa comata*) furnished the largest amount of feed per square foot of all the species measured, and 45 percent utilization of its annual growth is above the general "proper use factor" of 40 percent. This grass produced forage at the rate of 104.4 grams per square foot of ground cover, a third more than the next largest producer, western wheatgrass. Even though it furnished but 7 percent of the ground cover, it was second only to blue grama in the amount of feed it furnished to the sheep.

Threadleaf sedge, in spite of 65 percent utilization of its annual growth, ranked only ahead of big sagebrush in the volume of feed it furnished the sheep—this, primarily, because it provides only 6 percent of the ground cover. Its production rating is 57.8 grams per square foot. The general "proper use factor" for this species is 70 percent utilization, slightly above the actual use on this range.

Probably the biggest surprises were the utilization figures on blue grama and western wheatgrass, which had been accorded "proper use factors" of 70 and 50 percent utilization, respectively. Blue grama had a production rating of 43.8 grams per square foot and 26 percent actual utilization of its annual growth, and it is only because this species furnished 27 percent of the ground cover that it topped needle-and-thread grass in the amount of feed provided for the sheep. Western wheatgrass, with an actual use of 25 percent of its annual growth—almost equal to blue grama—had a production rating of 75.4 grams per square foot, but it furnished only 11 percent of the ground cover.

For this range—and presumably for other ranges with like rainfall, soils, and other conditions—the "proper use factors" need to be revised upward for two key species, brown sage and needle-and-thread grass. Downward revision is needed in the case of big sagebrush, threadleaf sedge, blue grama and western wheatgrass.

Because of the low quantity and quality of feed it produces, it is evident that high densities of big sagebrush are not desirable even on such a browse range as this. Small amounts are desirable, however, to give variety to the forage, and in time of deep snow big sagebrush may be the only feed accessible to the stock. The high productivity and high utilization of needle-and-thread grass indicate that some increase in this species is desirable at the expense of big sagebrush and blue grama. Since western wheatgrass was utilized equally as well as blue grama and produces half again as much forage, it, too, can take over profitably a part of the area occupied by blue grama and big sagebrush.

These illustrations emphasize the need for close observation of the use made of the important forage plants by livestock. A plan of management designed to encourage or perpetuate the better forage plants will be successful only if based on such use data under actual range conditions.

The results obtained here in localizing range information for the guidance of stockmen should impel range men generally to look into the effects of local variables on the utilization of range forage on other types of range lands. It is likely that there are opportunities for increasing forage production which heretofore have been overlooked, opportunities important to the livestock industry in general and to war production goals in particular.

HUMAN CONSERVATION IN NORTHERN WISCONSIN

ON Monday, September 8, 1941, I drove with M. F. Schweers, State Coordinator, to Antigo, Langlade County, Wis. With County Agent John Omernick, we spent the day reviewing the isolated settler program in that county.

The soils of Langlade County are of two general classes. The more level lands in the southwestern part are old lake beds and older drift of fair soil which, with the addition of limestone and fertilizer, produces good crops. The remainder of the county consists of morainic soils of sand and rock with some good soil scattered here and there. The zoned areas with their isolated settlers are generally in this latter section. As the settlers are removed, those who wish to continue farming are located in the lake bed soils area. Many of the tracts in the morainic area which may be fair soil are known as "frozen areas." That is, these places suffer from early summer and early fall freezes, making crops such as corn and potatoes too uncertain. These poorer soils produce good pine tree growth. We saw one area of Norway pine, 15 years old, that were 10 inches in diameter at the base and 25 feet

The observations presented here are from a report by F. A. Fisher, Chief, Project Plans Division, Upper Mississippi region, Soil Conservation Service, after a field review of the Wisconsin Isolated Settler project activities. In connection with this project the Soil Conservation Service is buying holdings of isolated settlers within districts zoned against further agricultural development. These settlers, because of their isolated locations, present social problems as well as problems of high costs for public services and facilities to local and State governments. By cooperation between local, State, and Federal agencies, families whose holdings are acquired are helped in becoming established in new locations where public services and facilities can be provided at a more reasonable cost and where the families may participate in community life and have a better chance of making a living. The Wisconsin Isolated Settler project was approved by the Secretary of Agriculture on September 19, 1938, and covers twenty-four northern Wisconsin counties. Since 1934, the holdings of about 375 isolated families have been acquired in connection with this and similar projects in northern Wisconsin. Most of the families have been relocated. In his report, a part of which is reproduced here, Mr. Fisher points out features and merits of this joint program of local, State, and Federal action which are frequently overlooked.—THE EDITOR.

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high—a better growth than can be expected on the average soils in this area.

As we drove and talked, we began to realize that the success of the isolated settler relocation program depended to a great extent on the interest taken in it by the zoning committee and the county agent. Again I was impressed by the fact that the isolated settlers are like any other people in that they have justifiable rights to their ideas, and success in getting them to move depends on good diplomatic relations with them. Making them feel that the final decision is theirs and not forced upon them by law, helping them in relocating, and displaying a keen interest in assisting them after they have moved—these are factors that help greatly. Mr. Omernick illustrated this by stories of instances where he had followed through and helped families to better their agricultural or nonagricultural positions. In this connection, too, we visited several of these people, and they had many questions to ask regarding soil treatments, livestock improvement, poultry management, pasture development, and conservation practices.

In going over the map showing tracts purchased and families relocated, the fact was brought out that, for approximately every farm purchased by Federal funds, the county exchanged lands with two others. It was further pointed out that in dealing with a small group of families using one road or school, unless funds were available to purchase the holdings of those who insisted on selling out, it would do no good to exchange with the others. The road or school problem would still remain. Therefore, the Federal and county programs must go hand in hand.

Mr. Omernick also stated that not over 10 percent of the isolated settlers ever were real farmers or had any desire to remain farmers. Four whom we visited were railroad shop workers from Chicago and Savanna, Ill., who were discharged during the depression. They had saved some money and, through land companies, had bought tracts in this area, "sight unseen."

Naturally an outsider who has never really studied the isolated settler conditions and the results obtained from the relocation work is inclined to measure the benefits in financial savings through the closing of schools, shortening of school bus routes, and discontinuing of roads. As he delves into the situation, however, by talking to people who have been moved out, and listens to stories from those in charge of the project, he finds that these are not the real values. The results that count are such intangible ones as removing these people from isolated locations and renewing their hope in America, their pride in their country, and giving them opportunities for community and social life with the advantages of better schools and recreational facilities for their children. The children have a chance to compete in 4-H Clubs and join Boy and Girl Scout troops. Religion is brought to both young and old through the churches of the community. Many of the men who have been located on good roads have found work and are thus taken off WPA and relief loads. Because of the distance these people live from the main roads, the county had quite a heavy expense for medical attention.

A few specific examples will point out more clearly what I mean by the intangible results of the isolated settler project in Wisconsin:

No. 1.—This family was moved to an attractive little home on a tract of a few acres. The head of the

family has work and is off relief. The children can go to a good school and the entire family is taking a part in the community life. Moving this family permitted closing a stretch of road and eliminated the necessity of rebuilding one good-sized bridge that would not have served any other settlers.

No. 2.—This family, with two children, has been located in a comfortable house near the highway. The father has a job on the highway. Before they were moved, they lived on a fire lane and the children could not go to school. Relocation has provided this family with a regular income and given them an opportunity to take their place in community affairs.

No. 3.—This settler was moved near the highway. He has a log cabin home and with a filling station and a few small cabins for tourists is making a living.

Nos. 4, 5, and 6.—The location of these families is similar to No. 3. Moving these families allowed the closing of one school and several miles of road. It also made possible retirement from cultivation of a fair-sized block of land, most of which has been reset to timber. The story of the soil is that it produced two crops and then was so poor that not enough could be raised on it to pay the operating expenses.

No. 7.—This family was relocated in a community where the man has fairly steady work which, with the income from his small acreage, furnishes a living for them. He has developed an interest in the community and the children are taking part in school and other affairs.

No. 8.—This individual was so far from any main roads it created a heavy county expense to care for him. He now has a small place on a main highway and is making a good living with his cow, chickens, and some bees and a roadside market of honey, maple syrup, and a few other articles. He has joined the local Grange and is very active.

No. 9.—The individual who bought this place proceeded to build a large, well-equipped dairy barn and other buildings before he realized he only had a few acres on his 80-acre farm that were suitable for cultivation. The farming project failed, the buildings deteriorated, and the owner was only too glad to sell for what he could get on a fair appraisal. The family left the community, feeling very much put out at a Government (although no Federal agency was ever consulted) that would allow people to be caught in such a deal.

No. 10.—We visited a farm which cost the original purchaser $1,800 and has since cost the county $2,500 for school and roads, besides relief to the individuals. Two families who were living there have been removed and are supporting themselves. Most of the land has been planted to trees by the CCC. Here we saw an illustration of diplomatic dealings with these people. Under permit, they are salvaging old buildings and cutting some trees on county-owned land for a barn on the new place. Mr. Omernick indicated that such assistance helps to keep peace and to have satisfied people. They will repay many times in helping to enforce the laws. He further indicated that, in his opinion, the greatest contribution of the rehabilitation work in Langlade County is the chance these people are given to make their own way and thus become good citizens with the opportunities of America for them and their children.

After lunch, we visited Mr. A—— who came to this country while in his teens. He worked in a railroad shop in Illinois until 1932 when the shop was closed. Through a land company, he bought 40 acres and moved on it with great hopes. He built a small house and barn but found only about four acres that he could farm, the rest being scrub timber and swamp. He struggled along until his savings of $1,500 were gone. He said he was gradually becoming doubtful about our form of Government, which, after what he

(*Continued on p. 288*)

HILL CULTURE FOR NATIONAL DEFENSE

(*Continued from p. 272*)

of one holly tree which would produce a cash crop of $25 value every year, yet not be injured in the least by the trimming.

These, and other things like them, are "hill culture." They are not, for the most part, new things, but rather a re-use, or a greater use, of resources we already have; of crafts and practices known to our forefathers. In some instances science has stepped in to give us better methods or to provide us with better tools—otherwise "hill culture" remains as native as ginseng and ramps.

The end of such a program is not to be seen in a day, or even in the present emergency. It is not so designed. After the emergencies of war we shall be faced with the less exciting, and often more acute, readjustments to a peacetime world. No one can tell what such a time will hold for us; but this we know—there will always be need for food, and if this can be produced at home, so much the better. No person imagines a time when a cash crop, even of small return, will be unimportant on our hill farms. "Hill culture" will do its bit in our national wartime program—it will hold and enrich our soil, and it will be in operation when we turn to the ways of peace.

BOOK REVIEWS AND ABSTRACTS

by Phoebe O'Neall Faris

OLD McDONALD HAD A FARM. By Angus McDonald. Houghton Mifflin, Boston. March 1942.

This is the book that "had to be written." The author, who works for the Soil Conservation Service—we call him Angus—carried this particular bit of Americana about in his head for more than five years, mulling over it, being "pestered" by it, wondering why he "had to do it." Now the story of one Oklahoma farm has become a book and the Old Man, Angus' father, an unforgetable character. The Old Man was "like the hills, the sky, or the soil that he loved so much"; he preached the Gospel on Sundays to save the souls of his neighbors, and on weekdays he worked like a horse, building up his own land and roaring at his neighbors about wasteful exploitation of Oklahoma's soil.

"This is God's earth, and you are sinning and desecrating His land when you plow up and down the hill," Old McDonald said. And although he did not know it he set the theme for this biographical story, and at the same time stalked his way across the fields of his "hill farm" to take his place in the rank and file of pioneer conservationists.

VICTORY GARDENS, *Miscellaneous Publication No. 483*; and Diseases and Insects of Garden Vegetables, *Farmers' Bulletin No. 1371*. United States Department of Agriculture, Washington, D. C.

If you have a big flourishing vegetable garden next summer, with some fruit trees and berry bushes, you will not need to worry about shortages. The fruits and berries probably are sugar-sufficient for good health; and you will be so busy keeping the garden "flowing along" with the subseasons that, tires or no tires, there will be little or no time for joy-riding. These two business-like bulletins, totaling 60 pages, can be stapled together and hung on the wall of the tool house to be used along with other gardening implements. In fact, they should come first, because they contain much valuable information concerning disease-free varieties and soil preparation for the healthy garden.

"Victory Gardens," compiled for wartime gardening by Bureau of Plant Industry specialists, is a garden outline showing, first, the vitamin and mineral values of the common garden vegetables; second, how to prepare and fertilize the soil and arrange the planting time-table for continuous harvests; and, third, how to mulch and cultivate to keep the soil in place and in good condition throughout the seasons. Three garden plans are shown in chart form, and these include spacing directions, suggestions for varieties and follow-up plantings, and the amount of seed needed for each row.

An insect or disease infested garden is not a productive garden, as all experienced gardeners know; and, furthermore, it is probably the most discouraging thing that can happen to the people who have reached the liniment-for-sore-muscles stage and find themselves up against an inadequate knowledge of the ways of bugs and slugs, and the bacteria and fungi that are the mortal enemies of garden crops. "Diseases and Insects of Garden Vegetables" is an old standby that has been used by many thousands of vegetable crop growers for the past 15 years. It is, of course, a Bureau of Entomology publication, and it has been kept up to date by revisions so that it becomes in the present emergency one of the most valuable and practical of government bulletins. It is, in fact, a rather extensive treatment of "garden troubles." The writing and organization both are admirable—the language is direct and without frills, and pests are arranged under specific garden crops. If you find a strange insect on your tomato vines, for instance, you need not know the name of the crawler because you will find him—and his portrait—under "tomato." You will also find what to do about the insect (or disease), and what you could have done to prevent the infestation had you thought about such things before you plowed your garden plot and purchased your seed!

The last few pages of Diseases and Insects of Garden Vegetables is devoted to fungicides and insecticides—how to mix them and how to apply them. Some miscellaneous control methods are treated briefly, as soil disinfection, seed fumigants, and protection of beneficial insects.

SOILS AND FERTILIZERS, 3rd edition. By Firman E. Bear. John Wiley & Sons, New York and London. January 1942.

After reading this book and studying its organization, one comes to the conclusion that farming—using the soils and the seeds of the world to produce the crops required by the people of the world—is the most complicated business ever conceived. In America, now that war with its stupendous production is upon us, we need to work fast to learn the fine points of building up poor soils as well as keeping all soils in place by means of erosion-control practices. Judging from Dr. Bear's carefully compiled book, there is much to know about the soil itself, the food and textile crop plants so badly needed, and the many different kinds of fertilizing agents before going out to buy commercial fertilizers or even before spreading manure on a field with the fond hope of producing a bumper crop for "quick money." This is the first text of its kind to correlate with precision the climatic factor, soil conservation practices, and problems of choosing and applying chemical and mineral fertilizers for greatly increased yields of a wide variety of crops.

Today fertilizers are very much in the news. Do not waste fertilizers—you see and hear these words everywhere. It is one of our most urgent problems in the food for freedom program. We must not fail in the wartime food production goal and we must guard our soils while growing and harvesting much larger crops of certain food plants. If every pound of fertilizer that we can get our hands on is used where it is needed, without waste, then the production goal will move many steps nearer during the planting and growing season. Dr. Bear must have been thinking along these lines when he went about the task of revising and augmenting his material and getting out this 1942 edition under a new title.

The book is designed as a text for agricultural colleges and, perhaps unfortunately in veiw of the war time emergency, it is a bit too technical for general farmer use. But soil fertility specialists or farmers familiar with chemical terms and symbols, can use it to advantage to obtain a more workable understanding of ways and means of handling soils and crops for maximum fertility and pro-

BOOK REVIEWS AND ABSTRACTS

continued

duction without loss of soil resources or waste of fertilizer materials.

The careful attention to specific crops is one of the book's best features; by this means the explanations of soil phenomena, water and atmospheric conditions, and the action of fertilizing agents are closely tied in with crop requirements. Even lime, used so widely through so many generations of farmers everywhere, is not to be thrown about promiscuously, without knowledge of soils and soil reactions, or without a wary eye on the weather and moisture conditions—certainly not while wartime production is paramount. This principle, applied to the true fertilizers, especially the expensive or scarce mixtures, should help greatly in saving the day for agriculture during the period of high production.

Apparently Dr. Bear believes first in saving the soil, keeping the soil in place, and second in maintaining its fertility by means of fertilizer applications. Thus he does not devote a single chapter to soil conserving practices and then forget all about them in presenting the tried and proved principles of fertilizer usage What he does is incorporate soil conservation and soil properties, crop growth requirements, and selection and application of fertilizers into a soil management plan for permanent agriculture. He explains as he goes: for example, you will find an explanation of effective mulches in a chapter headed "The Water in Soils."

The latter half of the 375-page volume is devoted to fertilizing agents: how to determine soil deficiencies by means of plant symptoms; how to choose the right fertilizer for the crop, the soil, the water supply, the cultivation practices, the kind of yield expected; how to apply the fertilizer and when; and, best of all, how to utilize every pound of fertilizer elements produced on the farm as by-product or as waste—ashes, lawn clippings and leaves, kitchen and barn refuse, sawdust, even sour milk.

Finally, it may be said that this unusually complete treatment of soils and fertilizers is compiled wholly from the viewpoint of farm and crop production economy—a very excellent feature especially in view of wartime needs and the fact that many a farmer will lack commercial fertilizers during the next few years, be his pocketbook thick or thin. The more you pore over the book the more you realize that Dr. Bear has thought of everything: every chapter ends with a "solution" or a "résumé" section suggesting ways and means of getting around shortages, of shifting the crop to fit the need for economy, how to side-step losses, and many other small economies that in the aggregate constitute tremendous gains.

WATCH YOUR STEP. Miscellaneous Publication No. 481, United States Department of Agriculture in cooperation with the Committee on Agricultural Safety, Federal Interdepartmental Safety Council. Prepared by Wellington Brink. Washington, D. C. February 1942.

This handy-sized bulletin already has gone a long way around the country in the attempt to head off farm accidents—at all times, but especially in this year of hurried and heavy work, scarcity of farm labor, and the tension of wartime production. In a recent, more normal year, 300,000 farm people were seriously injured by accidents, most of them preventable—on United States farms. Thousands die each year from accidents that could be prevented. These people are Americans, and their farms are American farms; all are essential to American life and effort. Most accidents can be avoided—hence this bulletin, now being widely distributed, which was compiled by men who have made a thorough study of the causes behind such farm catastrophes.

Watch Your Step is rather a different kind of Government bulletin—it has a snap to it, and a strain of humor, and it points out what to do and what not to do to prevent accidents and property loss on the farm, in and about the home, on the highway and in rural recreational activities. "Homey" everyday things are its theme. Saws, cisterns and pits, motor machinery, ladders, rotten railings, matches in the hands of little children, the farmer mending the roof, the stovepipe too near the woodwork, the worn electrical cord, wash day, the hayloft and the cigarette, the child playing on the highway—these are some of the hazards that can be easily and quickly removed.

This new bulletin is for farm people—available, free while the supply lasts, from the United States Department of Agriculture, Washington, D. C.

HUMAN CONSERVATION IN WISCONSIN

(Continued from p. 286)

had gone through, was not hard to do. Then he was induced by the County Zoning Committee to sell his farm and buy another tract of better land. The FSA loaned him $1,600 for a barn and livestock. He moved the house from his former place, and although it isn't much of a place, it is comfortable. He has a good barn, two well-built hen houses, some machinery, 10 cows and some young stock. He owns 80 acres of land, all paid for, and has paid $1,200 on his development loan. He could pay the remainder but is taking care of the payments as they come due and using the money for further improvements. In cooperation with the FSA he keeps accurate records of his farm. His herd averaged about 260 pounds of butterfat last year and his hens cleared over $200 above feed costs. Above all, his doubts about our form of Government are gone; he is proud of the opportunities our country has given him.

Later, we visited the farms of three brothers who had all worked in Chicago and then been caught in the land speculation. They, too, had given up much of their hope and faith in America; but today through the help of Federal agencies, each has a good farm and is doing well. While questioning the son of one of these men, we were told, "Yes, I can go to high school now and I want to go on to college and study agriculture."

U. S. GOVERNMENT PRINTING OFFICE: 1942

For REFERENCE

Compiled by ETTA G. ROGERS, Publications Unit

Field offices should submit requests on Form SCS-37, in accordance with instructions on the reverse side of the form. Others should address the office of issue.

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[1] Prepared solely for use by the Soil Conservation Service and official cooperators. Not available for general distribution.

[2] From Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

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The Facts About Conservation Farming and Yields

BY R. E. UHLAND[1]

THE PRESENT WAR is calling for increased production of many important crops and will therefore demand the assistance of all those engaged in agricultural pursuits. More than ever before, any recommended soil conservation measure will need to be evaluated on the basis of its effect on production or yield as well as its effectiveness in conserving soil and water. Costly mistakes in the unwise use of farm land during and following the last war must not be repeated.

Farmers have never been as concerned about data on saving the topsoil as about greater yields from land on which conservation measures are used. Partly for this reason extensive evaluation studies and field tests have been carried out over a period of years on many soil conservation projects. These studies greatly supplement the data secured on conservation experiment stations and furnish factual field data on the effects of conservation practices on yields.

The findings reported in this article show that conservation farming, including proper land use and supported by needed soil conservation measures, insures immediate and continuing increases in crop yields. These data are taken from different sections of the country and are quite indicative of results that can be expected from conservation farming.

In the Estancia Valley of New Mexico, where rainfall is limited, contour farming supported by terraces yielded 47.3 percent more beans for the 4-year period, 1936 to 1939, than did similar fields that were unterraced and farmed in straight rows. Thirty-four unterraced fields with straight rows were compared with 22 similar fields that were terraced and contoured. The difference in favor of the treatment ranged from a minimum of 12.1 percent in 1936 to a maximum of 82.3 percent in 1939.

Similarly, in 1939 wheat yields on nearly 200 fields in the Southern Great Plains were 31.3 percent greater where the land was terraced and contoured. The average yield for the terraced and contoured fields was 16.8 bushels per acre as compared with but 12.6 bushels where the land was farmed in straight rows without regard to contour. On two of the 7 projects on which yields were taken, the rainfall was above average and well distributed, and thus there was little difference in yield between the treated and untreated fields. Yields taken on a limited number of fields in 1940 showed similar increases for the treated fields.

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